



**Steve Johnson**

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## The Facial Identification Scientific Working Group Meeting

The Facial Identification Scientific Working Group (FISWG) held its fall meeting at the FBI Academy in Quantico, Virginia during November 18-22, 2013. Attending this meeting were representatives from the 23 national and international law enforcement agencies/organizations. The following is an excerpt of this five-day meeting.

**Jim Cole**, Program Manager of the Department of Homeland Security's Identification Unit (Investigation Branch), provided insight into DHS's role as investigator of child exploitation. The Identification Unit utilizes Facial Recognition (FR) technology to assist in identifying victims and perpetrators of child sex and exploitation crimes. One of the biggest problems facing law enforcement today is the burgeoning amount of data that is being generated due to the increased use of digital photography and the distribution of child exploitation material over the internet. As an example, Mr. Cole explained that the National Center for Missing and Exploited Children (NCMEC) recently received over 250,000 digital images in a one week period (November 4-10, 2013) and has received 99 million images since 2002. The volume of data is overwhelming NCMEC and other law enforcement agencies in their efforts to investigate these heinous crimes. DHS has been working on a program called "Project VIC" that will help law enforcement agencies (LEA) efficiently deal with this huge amount of data.

DHS is currently providing support for photo/video enhancement research, creation of wanted/person-of-interest flyers for regional and national distribution and improvement of automated processes in the development of face-based repositories. This technology includes image review that creates and stores a "best of" image as a representation for future research and investigation. Additional research is being utilized to identify the source of images including using EXIF data to identify camera model/serial number info, geo-location of the photo and visually similar patterns that will link benign photos to those of interest to LEAs. Despite challenges, DHS is committed to the human interest element of solving these child exploitation issues and has strong interagency support, both nationally and internationally.

**Patrick Grother** (NIST) brought the FISWG members up to speed regarding the most recent Facial Recognition Vendor Testing (FRVT), primarily on the one-to-many (1:N) front.

While accuracy is increasing, the miss rate continues to be linear as population size increases. The False Negative ID Rate (FNIR) can be calculated using the following formula:

$$\text{FNIR } (N, R, T = 0) = aN^b$$

Of the numerous vendors in the test, NEC's algorithm showed a decrease in False Positive Identification Rate (FPIR) as database size increased. Overall, NEC's algorithm showed the most improvement and displayed the best results.

Additional testing was conducted to determine accuracy across various age spectrums, gender and twins. Neurotec's algorithm demonstrated the lowest false match rate when tested against a twins database and Cognitec demonstrated a 65% accuracy rate on images that were within five years of each other on the aging scale, although all testing algorithms consistently underestimated on Asian ages. Research shows that the utilization of "composite sketches" as search probes remains very poor when it comes to positive results. Other issues being addressed in the FRVT were pose allowances to include rotational and pitch deviations.

**Johanna Morley** of the United Kingdom Metropolitan Police (Technology Research and Innovation) provided the latest from the UK Metro Police and their FR efforts and history. UK Metro has been active in FR since 2009 and currently has over 2.3 million images in their database (including legacy data). They add between 750-1000 arrest images a day to the database and further include submission from CCTV and passport photos to add approximately 60% of the overall images. There is a growing need to do some Quality Assurance (QA) review of existing images, so they are utilizing a QA tool that rapidly ID's poor quality or non-face images for further enhancement or deletion. Additional research into automated 1:1 examination shows poor results.

UK Metro also has engaged in research to utilize mobile FR in dealing with "public disturbance" events. The research centered on car-mounted and stationary-capture devices and collecting facial images of people on the street in both static and mobile events in order to conduct "retrospective FR" investigations. The results of this testing were downplayed as the source of test images represented a limited demographic (primarily W/M law enforcement personnel). The initial



results were not overly promising, but research continues and there is hope that improved capture technology a broader demographic will improve the results.

Interpol (an international law enforcement cooperative) was established in 1923 and now has over 180 member nations. Interpol's **Campbell McGhee** works in the Lyon, France, office and has been tasked with developing a better FR capability for Interpol's use. This was Interpol's first FISWG meeting. Interpol works with its member nations to try to track and intercept criminals who venture across international lines. They have a color-based protocol for alerting member countries to attempt arrest, provide information, give warnings or offer intelligence about criminals of interest. Additional communications provide Modus Operandi (MO) as well as missing/unidentified person data. Interpol began working with Morpho in 2012 to develop a Face Recognition system that would support their worldwide law enforcement efforts. The target for deployment is the summer of 2014. The FR project is currently under the authority of the Identification Branch of Interpol. The current Interpol database of "persons of interest" is very small (less than 200,000), so it is hoped that this small size will improve positive search results accordingly. Interpol is currently surveying its members to determine their needs/expectations for the new FR system.

Like many new FR systems, Interpol is limited by funding and staffing shortages. They hope this new relationship with FISWG will provide them with guidelines and standards for future FR expansion.

**Justin Cook** of the FBI's Criminal Justice Information Services (CJIS) updated the group of ongoing efforts to deploy the Next Generation Identification (NGI) system. CJIS expects that "Increment 4" (which includes FR) of the NGI deployment will be final in the summer of 2014. This will include the deployment of the interstate photo system. Scars/Marks/Tattoos (SMTs) will be included as a search filtering option in addition to age, race and gender. The system will also provide photo lineup generation. There are currently 16.7 million photos in the CJIS database (not all of which are face images).

Bulk submission will be run through a QA algorithm to get a "best image" for future review. There is a need to develop QA/QC standards prior to full deployment of NGI. Additional guidelines for face capture to include pose, background, expression, occlusion and capture elements were also discussed. The FBI's Universal Face Workstation (UFW) software is now available at no cost to LEAs and other government organizations.

**Ken Mekeel** and **Edwin Coello** from the New York Police Department represent the NYPD's Real Time Crime Center (RTCC) as part of the Identification Section. Their primary purpose is to utilize FR based technologies to create "likelihood" scenarios. They have activity exploited "social networking" sites (Facebook, MySpace, LinkedIn) to assist with their investigative

efforts with a great deal of success.

Since 2011, there have been over 200 arrests that resulted from efforts by the RTCC, and Mekeel and Coello elaborated on a number of success story examples. Det. Mekeel announced that he will be retiring from the NYPD in March of 2014. Mekeel is one of the original members of FISWG. Det. Coello will be replacing him at future meetings.

**Angela Miller** from the Department of State (DoS) and her team addressed those present of the current affairs at DoS and the ongoing FR. A current project involves the effect of glasses on FR accuracy and whether future passport requirements should include removal of glasses for all passport photos. As stated in earlier reports, DoS has over 120 million visa photos and 125 million passport photos in their databases.

Representing the Federal Bureau of Prisons (FBP), Office of Science and Technology, **Todd Craig** updated the membership about the Bureau's ongoing FR and alias detection. The FBP is utilizing thermal image and "fencing" detection to monitor prison perimeters and are researching 3D FR in conjunction with the U.S. Marshalls Office. Beyond the FR aspects, body scanners to detect contraband (SecurPas) and voice recognition (voice capture) are also being investigated. Future research is being conducting on "user-friendly" automated, biometric booking stations (that include palm print, iris, fingerprint and face capture) and systems that are ANSI/NIST compliant.

**Dr. Jonathon Phillips** of NIST discussed the ongoing research into the characteristics of the range of human performance in FR. There is a dichotomy of what's considered "normal" ability with what's determined to be the result of training to expertise. Testing was conducted using psychometric materials as well as normative data (proficiency tests such as the Glasgow face-match test). Dr. Phillips was hopeful that FISWG will be an active participant in future research and testing to set the basis for measuring forensic performance.

**Dr. Eric Granger** from the University of Quebec discussed the Canadian government's ongoing research in collaboration with the University of Quebec. The Canadian Border Security Agency has been working with a "PROVE IT" algorithm. The pilot program involves research on operational video-based evaluation of infrastructure and technology (Face Recognition in video capture). The university was also polling users to evaluate methodologies and determine case study applications. The goal is to provide watchlist support for video to still/still to video searching as well as video to video search and retrieval. The testing showed some recognition success in semi-controlled environments but challenges remain regarding lighting variants, environmental controls, aging and data storage (videos require huge amounts of storage space).

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